

OIL ASH CHEMISTRY IN UTILITY BOILERS AS RELATED TO ADDITIVE TREATMENT.

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Several hundred sets of ash samples from boilers of varied design, burning heavy oils have been analyzed by means of wet chemistry, XRF, XRD, SEM, and petrographic analyses. Other tests were performed to determine solubilities and melting behaviors. Most oil ashes can be characterized on the basis of four components: V_2O_5 , Na_2O , MgO (or XO), and SO_3 which control the chemical and physical properties of deposits formed. Oils are categorized into three major groups on the basis of quantities of S, V, and Na and on the ratio Na/V . These categories are: (1) high V and S, low Na, (2) medium V and S, low to medium Na, and (3) low V and S, medium to high Na. Variations in ash chemistry are related to additive rates, to amounts and ratios of oil impurities, and to relative location in the boiler where the ash was deposited. Physical properties of ash deposits are dependent on the position in the boiler, on the types and quantities of phases present, and on the distribution of these phases within the deposits.